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**TITLE OF THE INVENTION**

**BED-BICYCLE AND METHOD OF USE**

This application claims priority from U.S. Provisional Application No. 60/428,941, filed November 26, 2002. The entirety of that provisional application is  
5 incorporated herein by reference.

**BACKGROUND OF THE INVENTION**

**Field of the Invention**

The present invention relates generally to the field of medical exercise equipment, and more particularly to exercise equipment for use in bed.

10 **Background of the Technology**

People who are bed ridden for health reasons often suffer complications the result from the lack of physical exercise. One reason for this lack of exercise is that bed-ridden persons often exercise only when health workers, such as physical therapists, are available to assist and motivate them. Some of the serious  
15 consequences of lack of exercise in bed ridden people include the following:

- 1) Loss of muscle tone, strength and bulk, particularly for arm and leg muscles;
- 2) Depletion of calcium content of bones, making such bones brittle and prone to fracture;

- 3) Risk of blood clots (i.e., deep venus thrombosis) in the leg veins, that can break loose and travel to the lungs (i.e., pulmonary embolism) resulting in various life-threatening situations; and
- 4) Bed sores from sustained pressure on immobilized body parts.
- 5 Given the foregoing, there remains an unmet need for exercise equipment readily available and easily usable by bed-ridden patients and others while in bed.

### **SUMMARY OF THE INVENTION**

The present invention, referred to in one embodiment and referred to interchangeably herein as a “bed bicycle” or “bed-bike,” provides a stationary, bed adapted, bicycle-like exercise equipment device for separate or simultaneous arm and leg exercises, for use while the user is lying down, such as in bed. In one embodiment, the bed-bike is constructed of detachable sections that may be assembled and taken apart easily. The bed-bike of this embodiment is thus capable of being assembled in place only during exercise sessions, so as, for example, not to impede other care-giving functions.

Further features and advantages of the present invention as well as the structure and operation of various embodiments of the present invention are described in detail below with reference to the accompanying drawings.

## **BRIEF DESCRIPTION OF THE FIGURES**

The features and advantages of the present invention will become more apparent from the detailed description set forth below when taken in conjunction with the drawings in which like reference numbers indicate identical or functionally similar elements.

Figures 1 and 2 illustrate an exemplary embodiment of the bed-bike in operation, in accordance with the present invention;

Figures 3 and 4 illustrate close up profile and perspective views, respectively, of an example anchoring base unit portion of a bed-bike, in accordance with an embodiment of the present invention;

Figures 5 and 6 illustrate close up profile and perspective views, respectively, of an example top-side unit portion of a bed-bike, in accordance with an embodiment of the present invention; and

Figure 7 is a diagram of an example foot-pedal or hand-pedal unit, in accordance with an embodiment of the present invention.

## **DETAILED DESCRIPTION**

An exemplary embodiment of the bed-bike in accordance with the present invention will now be described in conjunction with the attached figures. The described embodiment is intended to be merely illustrative of various features in accordance with the present invention, and not limiting to the described example. In fact, after reading the following description, it will be apparent to those skilled in the relevant art(s) how to implement the following invention in alternative embodiments.

Figures 1 and 2 illustrate an exemplary embodiment of the bed-bike in

operation, in accordance with the present invention. As shown in Figure 1, in a first mode of operation, as used, for example with an adjustable bed or other support 1, a user 2, such as a bed-ridden patient, performs leg exercises (e.g., leg pedaling) using the device 3 positioned and adjusted for leg exercise use. In a second mode of operation, as shown in Figure 2, a user 2 on a flat bed or other support 20 performs arm exercises (e.g., arm pedaling) using the device 3 positioned and adjusted for arm use. In one embodiment, both the leg and the arm pedaling devices may be simultaneously installed and used, as described further below with reference to Figures 5-7.

As described further below, the exemplary embodiments shown in Figures 1 and 2 include the following components/portions: an anchoring base unit; a top-side unit; a foot-pedal unit; and a hand-pedal unit.

Figures 3 and 4 show close up profile and perspective views, respectively, of an example anchoring base unit portion of a bed-bike, in accordance with an embodiment of the present invention. As shown in Figure 3, the anchoring base unit 30 includes a frame portion 31, such as a rectangular hollow steel frame, that is positioned beneath and is stabilized (e.g., by friction and/or pinning) at, for example, the foot end of a bed mattress or other user support (e.g., mat, table, or like platforms) 20.

As further shown in Figures 3 and 4, the base unit 30 also includes attachment sections 32, perpendicularly oriented longitudinally *a* to plane *b* of the frame portion 31, as shown in Figure 3, which, when used, for example, with a mattress 20, about an end 21 of the mattress 20. The attachment sections 32 also serve as a connectors for

a connecting top-side unit, further described below, with regard to Figures 5 and 6 and accompanying text.

Figures 5 and 6 present close up profile and perspective views, respectively, of an example top-side unit portion of a bed-bike, in accordance with an embodiment of the present invention. As shown in Figure 5, the top-side unit 50 includes frame components, such as rectangular hollow steel portions. In one embodiment, a support section 51 of the unit 50 is designed to rest on the surface of a mattress or other user support 20. Connecting sections 52, perpendicularly oriented *c* longitudinally relative to the plane *d* of the support section 51, as shown in Figure 5, are attachable to the attachment sections 32 of the anchoring base unit 20.

These sections 52, 32 may be connected in a variety of ways known in the art. For example, each of the sections may be constructed of rectangular hollow steel portions, with one section (e.g., 52) being shaped and/or sized such as to be insertable as a male portion into a corresponding female portion of the other section (e.g., 32). The sections may also optionally be lockably connected, as is known in the art, such as by pins, frictional fitting, or other locking mechanisms and/or techniques.

As also shown in Figures 5 and 6, a mounted housing 54, perpendicularly extending relative to the planar direction of the support section 51, is centered on the frame 50 with one or more pedal extension receiving features 55, 56 such as tubular sockets for receivably seating foot-pedal and hand pedal shafts, as known in the art and as described further below with regard to Figure 7 and accompanying text. In one embodiment, both a foot pedal and an arm pedal are usable simultaneously via, for example, use of a foot pedal unit, as described further below with regard to Figure 7, inserted into a first pedal receiving feature 55, and use of an arm pedal unit, as

described further below with regard to Figure 7, inserted in a second pedal receiving feature 56.

Figure 7 is a diagram of an example foot-pedal or hand-pedal unit, in accordance with an embodiment of the present invention. As shown in Figure 7, a foot-pedal or hand-pedal unit 70 is attachable to or via a pedal extension receiving feature 55, 56, as shown in greater detail in Figures 5 and 6. In one embodiment, the unit 70 includes one or more shaft portions 71, 72. For example, in one embodiment, a first shaft portion 71, such as a hollow steel shaft, is fittably and slidably receivable (or otherwise receivable, as is known in the art) into a socket pedal receiving feature 55, 56. To provide for adjustment of the length of the shaft, in this embodiment, a second shaft portion 72 is telescopingly slidably receivable in the first portion 71 (or receivable vice versa), and optionally lockable at a preferred position, such as via use of pins or other locking features known in the art.

Attached to the one or more shaft portions 71, 72 at an end opposite the end of the shaft portions 71, 72 attached to the pedal receiving feature 55, 56 is a rotatable or otherwise reciprocating pedal portion 75 for allowing pedaling motion by a user. As is known in the art, the pedal portion may optionally include features, such as an adjustable frictional contact device contacting the central pedal shaft, to allow variable resistance to be provided to pedaling. Use of a longer shaft or shafts 71, 72 or adjustment of the shafts 71, 72 to lengthened positions allow use by the user's arms, as shown in Figure 2, while use a shorter shaft or shafts 71, 72 or adjustment of the shafts 71, 72 to shortened positions allow use by the user's legs, as shown in Figure 1.

While various embodiments of the present invention have been described above, it should be understood that they have been presented by way of example, and not limitation. It will be apparent to persons skilled in the relevant art(s) that various changes in form and detail can be made therein without departing from the spirit and scope of the present invention. Thus, the present invention should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

Further, the purpose of the foregoing Abstract is to enable the U.S. Patent and Trademark Office and the public generally, and especially the scientists, engineers and practitioners in the art who are not familiar with patent or legal terms or phraseology, to determine quickly from a cursory inspection the nature and essence of the technical disclosure of the application. The Abstract is not intended to be limiting as to the scope of the present invention in any way.